

The role of the Community Pharmacist in promoting vaccinations among general population according to the National Vaccination Plan 2017-2019: results from a survey in Sicily, Italy

F. Scarpitta¹, V. Restivo¹, C.M. Bono², C.E. Sannasardo¹, C. Vella¹,
G. Ventura¹, S. Bono¹, S. Palmeri¹, F. Caracci¹, A. Casuccio¹,
C. Costantino¹

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Parole chiave: Farmacia, farmacista territoriale, vaccinazione, counselling vaccinale, operatori sanitari

Abstract

Introduction. The 2017-2019 Italian National Vaccination Plan promotes the improvement of knowledge and attitudes of healthcare workers about vaccine prevention, in order to spread a vaccination culture among general population. Similarly to the General Practitioner, the Pharmacist represents a fundamental forefront for both patients and healthy people, also in promoting vaccine acceptance. This research aims to analyze knowledge and attitudes about vaccines of Community Pharmacists and to evaluate the burden of vaccination counselling during their work activities.

Material and methods. A standardized, self-administered and previously validated questionnaire, including 5 sections and 28 items, was submitted to a sample of Community Pharmacists working in Western Sicily. The survey was carried out through an online questionnaire, that investigated socio-demographic data, knowledge and attitudes towards vaccination and the role of the Pharmacist as vaccination counselor during his work.

Results. A total of 120 Pharmacists were surveyed. 99.2% of them were definitely agreed with the Regional Vaccination Schedule. A large majority ($n = 114$, or 95%) were fully vaccinated and have vaccinated, or would vaccinate in future, their children. According to Community Pharmacists interviewed, at least 90% of clients asked for further explanations about vaccination, and the citizens' trust towards vaccination increased (30%) or remained stable (54.2%) over time in the last 5 years. Finally, as reported by interviewed Pharmacists, a correct counselling provided by General Practitioners (GPs) and Family Pediatricians was the main boost in increasing vaccination confidence, instead of mass-media and web misinformation that has led to skepticisms among general population.

Conclusions. The study demonstrated the key role of the Community Pharmacist for their consumers in vaccination counselling. In future, a strong collaboration between Community Pharmacists and all the actors promoting vaccination themes (GPs, family Pediatricians, public health workers) will be essential, as well as a uniform and standardized University training on vaccination themes for all these categories.

¹ Department of Health Promotion, Mother Child Care, Internal Medicine and Excellence Specialist "G. D'Alessandro", University of Palermo, Italy

² Pharmacist, Study course in Pharmacology, University of Palermo, Italy

Introduction

In the last years, the fall of vaccination coverages, due to the spread of fake news through mass and social media and to the poor counselling activity of some health-care workers (HCWs) practicing in vaccination field, determined epidemics of vaccine preventable diseases in several European Countries, including Italy (1-6).

The 2017-2019 Italian National Vaccination Plan (INVP) promotes active vaccination offer to all age groups and also to selected at-risk populations, also through the revision and/or improvement of the vaccination strategies, with the aim of increasing coverages among the general population (7). Furthermore, the 2017-2019 INPV promotes the improvement of knowledge and attitudes of HCWs on vaccine prevention, in order to spread a vaccination culture among general population (7). Similarly to the General Practitioner (GP), the Pharmacist represents a fundamental forefront for patients and healthy people, as suggested in the INVP and in the “Vaccine and Vaccinations” document, edited by the Italian Society of Pharmacology, in partnership with the Scientific Societies who handled the National Vaccination Schedule (7, 8).

In Italy, the Community Pharmacists represents, together with GPs and Family Pediatricians, the health institution of reference for the general population, regarding pharmacological and sanitary issues (9).

Pharmacies participate in the implementation of health education programs and prevention campaigns, using information methods adapted to the type of structure and, where necessary, after a prior, specific training of pharmacists operating there (9).

Moreover, the role of Community Pharmacists in promoting vaccinations was emphasized in a recent (January 2017) resolution of the Italian Health Department(10). In particular, it was

established that consumers will be able not only to preorder all vaccines offered by the National vaccination schedule, but also to perform these vaccinations in a dedicated setting in the pharmacy, in the presence of a reference health care professional (GP, Family Pediatrician or any Public Health Professional) (10). This forward perspective requests as necessary a strong partnership between the Community Pharmacist and the Public Health Institutions, in order to increase vaccination coverage among the general population, reaching the minimum standards for herd immunity (11, 12).

This research aims to analyze knowledge and attitudes about vaccination among a sample of Community Pharmacists, working in Western Sicily. Moreover, it aims to evaluate the impact of vaccination counselling performed by the Community Pharmacists during their work activities and the characteristics of the consumers that usually require information about vaccines and vaccination.

Methods

Questionnaire

The survey has been conducted from August to December 2017, throughout the submission of a self administered and anonymous questionnaire.

The questionnaire, reproduced in Figure 1, has been submitted to the Pharmacists, who could fill it out independently on any portable device (even the personal ones). Moreover, it was possible, with an internet connection, to fill it out using a specific link to the Google Documents® platform (13).

Before the submission of the questionnaires, an introductory letter illustrating the project and signed by the President of the Sicilian Pharmacists Board was sent to Community Pharmacists operating in the Agrigento and Palermo provinces.



Questionnaire of the research project:

"The key role of Community Pharmacist in promoting vaccination among general population"

Gender: male female **Age** _____

Personal opinion about vaccinations: positive neutral negative

If neutral/negative opinions, what kind of doubts regarding vaccinations? _____

Intention to vaccinate themselves in future: Yes No

Intention to vaccinate their children in future according to Vaccination Schedule:
 Yes, at all Yes, partially No

Vaccinations were administered at appropriate age: Yes No I don't know

Too much vaccinations were administered together: Yes No I don't know

Vaccine-related anaphylactic shock are more or less frequent compared to food-related one:
 300 times more frequent 300 time less frequent have the same frequency

Your opinion about the recent reported meningitis cases in Italy in 2016:
 an epidemic build up by mass media a meningitis epidemic in Tuscany, but not in Sicily
 a meningitis epidemic observed in all Italian Regions

Which of these vaccination websites was previously consulted (possible multiple responses):
 vaccinarsi.org salute.gov epicentro.iss.it focus.it mednat.it disinformazione.it

Which of these vaccination websites was considered reliable (possible multiple responses):
 vaccinarsi.org salute.gov epicentro.iss.it focus.it mednat.it disinformazione.it

Prevalent age class of the pharmacy consumers:
 young adult (18-30 years) adult (31-64 years) elderly (≥ 65 years)

Frequency of explanation requests about vaccination topics by pharmacy consumers:
 often (at least 1 request daily) rarely (2/3 requests weekly) never

Prevalent age class asking explanations about vaccinations issues among consumers:
 young adult (18-30 years) adult (31-64 years) elderly (≥ 65 years)

Change of vaccination confidence among consumers in the last five years
 vaccination confidence increase unchanged vaccination confidence decrease

Main reason reported by Community Pharmacists for consumers vaccination refusal
 lack of knowledge vaccination failure among family members fear of possible adverse events decrease

Figure 1 - Questionnaire administered to the Community Pharmacists operating in the Provinces of Palermo and Agrigento

Agrigento and Palermo are the two most populated Provinces of Western Sicily, accounting for 442,049 and 1,268,217 inhabitants respectively (14).

The questions about knowledge, attitudes and perceptions of Community Pharmacists regarding vaccinations were edited and validated from previous surveys carried out among Italian HCWs, by the researchers of the Department of Sciences for Health Promotion and Mother and Child Care of the University of Palermo (15-18).

On the other hand, answers to questions about knowledge and attitudes of consumers and general population were partially obtained from previously validated surveys carried within a multi-center project funded by the Italian Center for Diseases control of the Italian Health Department (19, 20).

The standardized questionnaire, made up by 5 sections and 28 items, investigated:

1. Socio-demographic data: gender, age;
2. Knowledge and attitudes about vaccinations and vaccine preventable diseases: age of administration, number of vaccinations of the National Immunization Schedule, frequency of vaccine-related adverse reactions, attitude towards the Italian and Sicilian meningitis epidemic (21, 22); consciousness of the approval of the 2017-2019 INVP concerning the settlement of a dedicated place for vaccinations inside the pharmacies;
3. Attitudes and behaviors towards vaccinations and possible reasons behind a neutral or negative attitude; attitudes in vaccinating themselves or their children;
4. Main sources of information about vaccinations and personal capability of using the web: consciousness about the reliability of pro and anti-vaccines websites;
5. Burden of vaccination counselling during work activities: age class, attitudes and perceptions and possible reasons behind lack of vaccination knowledge of clients.

Statistical analysis

Data collected has been automatically registered on a file locked by password and exclusively accessible to researchers, in order to guarantee the privacy of the surveyed subjects.

All the qualitative variables examined have been calculated as absolute and relative frequencies, instead the quantitative variables have been resumed as median (interquartile range). Moreover the categorical variables have been analyzed through the Chi-square (Mantel Haenszel) and the medians have been compared between them using the Mann-Whitney and Wilcoxon tests.

The whole dataset has been uploaded on a database created with Excel ver. 1997-2003 and examined with the statistical analysis software EpiInfo ver. 3.5.1.

This study has been previously examined and approved by the reference Ethics Committee of the University Hospital of Palermo, Italy and registered on the report n.05/2017 in the session of the 11th October 2017.

Results

Pharmacists who completed the survey were 120 on 163 questionnaires distributed (response rate: 73.6%). As reported in Table 1, the percentage of males (n = 61) and females (n = 59) was quite homogeneous. Mean age was 47.4 years (SD \pm 12.8) and the population surveyed had a median age of 45 years (range 27-70).

The large majority of respondents has positive attitude regarding vaccinations, and at the same time would be vaccinated in future (99.2%). A 95% of Community Pharmacists involved in the study declared they vaccinated or would completely vaccinate in future their children, according to the Regional Vaccination Schedule.

The 93% of surveyed Pharmacists thought that vaccinations included into the Sicilian

Table 1 - Socio-demographic characteristics, attitudes and knowledge towards vaccinations of the Community Pharmacists interviewed (n = 120).

	n = 120
Gender, n (%)	
- male	61 (50.8)
- female	59 (49.2)
Age, mean \pm DS	47.4 (\pm 12.8)
Age, median (range)	45 (27-70)
Personal opinion about vaccinations, n (%)	
- positive	119 (99.2)
- neutral	1(0.8)
- negative	0 (0)
Intention to vaccinate themselves in future, n (%)	
- yes	119 (99.2)
- no	1 (0.8)
<i>Intention to vaccinate their children in future according to Vaccination Schedule, n (%)</i>	
- yes, completely	114 (95)
- yes, but only with some vaccines	5 (4.2)
- no	1 (0.8)
<i>In your opinion, vaccinations are administered at the proper age? n (%)</i>	
- yes	111 (93)
- no	6 (5)
- I don't know	3 (2)
<i>Vaccine-related anaphylactic reactions are more or less frequent compared to the food-related ones, n (%)</i>	
- 300 times more frequent	6 (5)
- 300 times less frequent	32 (76.7)
- has the same frequency	22 (18.3)
<i>Your opinion about the recent reported meningitis cases in Italy in 2016? n (%)</i>	
- an epidemic build up by mass media	60 (50)
- a meningitis epidemic in Tuscany, but not in Sicily	49 (40.8)
- a meningitis epidemic observed in all Italian Regions	11 (9.2)

Vaccination Schedule were administered at the right age. Additionally, 83% of them (n = 99) declared that not too many vaccinations are administered together in a single vaccination session (data not shown).

In regards to knowledge about vaccinations and the vaccine preventable diseases, in Table 1 the answer concerning the frequency of serious adverse reactions to vaccines (anaphylactic shock, for example) was analyzed, comparing them with the food-related ones. 76.7% of respondents

(n = 92) correctly declared that vaccine-related adverse reactions are 300 times less frequent than those caused by food. Moreover, half of interviewed Pharmacists considered the recent cases of meningitis in Italy, an epidemic build up by mass media. 40.8% (n=49) correctly answered that a real meningitis epidemic occurred in Tuscany, while in Sicily mass media emphasized the small number of observed cases.

Only 7% (n = 9) of the surveyed sample declared to know vaccine-related adverse

events among relatives, friends, colleagues or clients (data not shown).

In particular, 4 cases of anaphylactic reactions, 3 cases of an autism spectrum disorder insurgence after vaccination and one case of paresthesia and burning on the limb were reported (data not shown).

In Figure 2, the most consulted (2a) and reliable (2b) websites about vaccination topics visited by the interviewed Pharmacists, were showed.

In particular, institutional websites with strong scientific advocacy, such as <salute.gov> (official site of the Ministry of Health), <vaccinarsi.org> (official site of scientific societies dealing with vaccination in Italy), were considered as the most consulted and reliable sources, according to the Community Pharmacists interviewed, in

strong disagreement with poor results of anti-scientific websites (such as <mednat.it> or <disinformazione.it>).

In Table 2, the socio-demographic characteristics and attitudes of clients requiring information about vaccination topics were included.

Particularly, the majority of the Pharmacy clients belonged to 30-65 years (52.1%) or over 65 age classes (37.1%).

The age class 30-65 years asked most frequently explanations about vaccination topics (72.5%).

Moreover, according to the interviewed Pharmacists, more than 90% of their clients asked for explanations about vaccinations during work activity (often=37.5% or rarely=55.5%). The confidence in vaccinations of their clients in the last 5

Table 2 - Socio-demographic characteristics and attitudes towards vaccinations of the clients that ask information about vaccination topics to Community Pharmacists interviewed (n=120).

N=120	N	%
<i>Prevalent age class of the pharmacy clients</i>		
- young adult (18-30 years)	6	5
- adult (31-64 years)	65	54.2
- elderly (≥ 65 years)	49	40.8
<i>Frequency of explanation requests about vaccination topics by pharmacy clients</i>		
- often (at least 1 request per day)	45	37.5
- rarely (2/3 requests per week)	66	55
- never	9	7.5
<i>Prevalent age class asking explanations about vaccinations issues among clients</i>		
- young adult (18-30 years)	8	6.7
- adult (31-64 years)	87	72.5
- elderly (≥ 65 years)	25	20.8
<i>Change of vaccination confidence among clients in the last five years</i>		
- vaccination confidence increase	36	30
- unchanged	65	54.2
- vaccination confidence decrease	19	15.8
<i>Main reason reported by Community Pharmacists for vaccination refusal among clients</i>		
- lack of knowledge	56	46.7
- vaccination failure among family members	9	7.5
- fear of possible adverse events	55	45.8

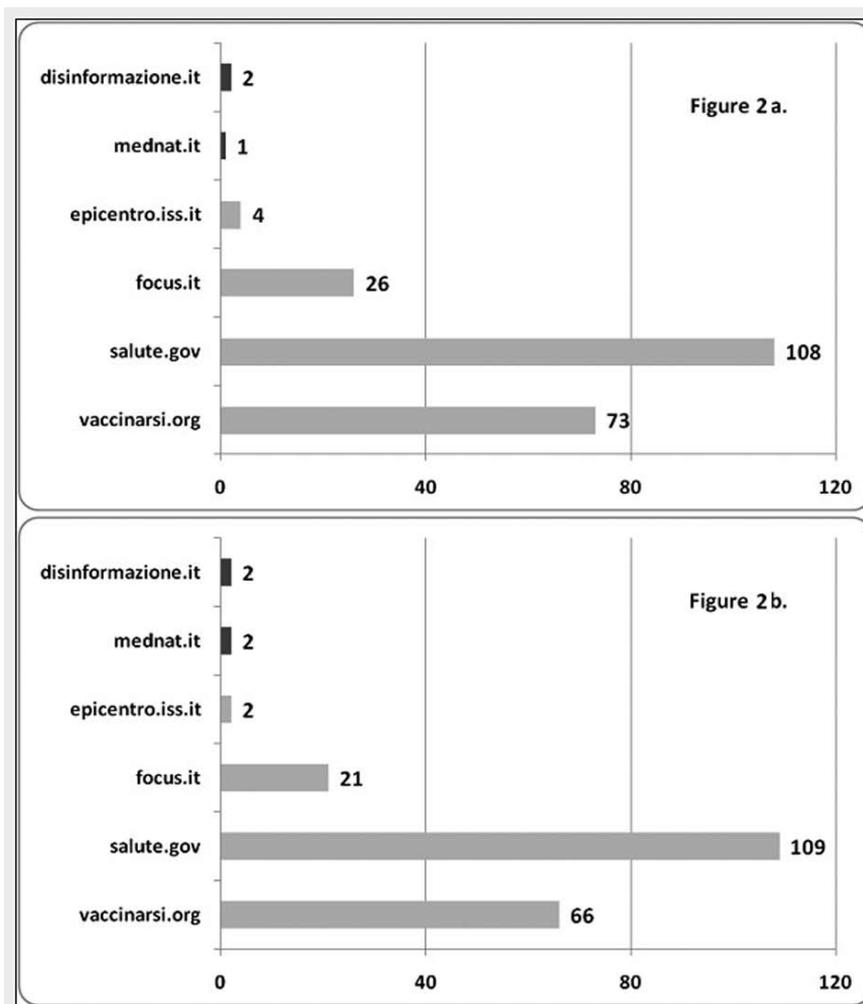


Figure 2 - Websites consulted (a.) and considered reliable (b.) about vaccination issues, according to the 120 Community Pharmacists interviewed (*more than one answer permitted*).

years, did not change (54.2%) or increased (30%). The main reason reported by Pharmacists as responsible for the increase in vaccination coverage of the clients was the counselling of the reference Physicians (General Practitioner or Family Pediatrician). On the other hand, the disinformation on vaccination topics provided by some mass- and social-media was considered the main drive for the decrease of vaccination confidence among clients of the Community Pharmacists interviewed (data not shown).

Regarding vaccination acceptance of their clients, a lack of knowledge about vaccinations (46.7%) and the fear of possible adverse reactions (45.8%) were reported by the Pharmacists as the main two reasons. Finally, Figure 3 showed the opinions of Community Pharmacists regarding the recommendations provided by the 2017-2019 Italian National Vaccination Plan, about a dedicated space for vaccinations in each pharmacy. 36.7% of Community Pharmacists declared that such a site was

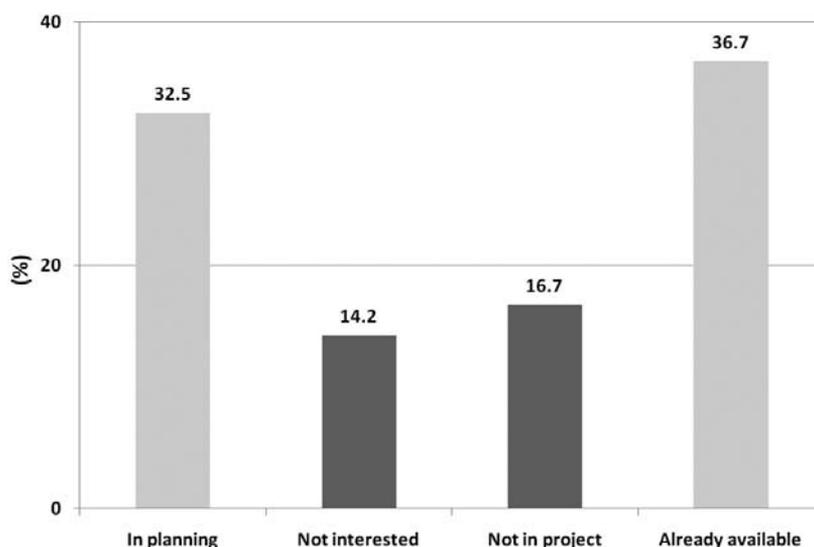


Figure 3 - Set up or planning of a dedicated place for vaccination inside the Pharmacy in which each Community Pharmacists interviewed actually work, according the 2017-2019 Italian NVP recommendations.

already available, 32.5% affirmed that it had been planned.

Discussion and Conclusions

In Italy, vaccination issues are nowadays extensively discussed and debated in both political and scientific arenas (23).

The counselling from HCWs was recognized as one of the main factor in vaccines acceptance among general population, besides mandatory vaccination policies (12). This study tried to analyze the possible role of the Community Pharmacist in improving knowledge and positive attitudes regarding vaccination topics, among general population, and to evaluate the burden of their counselling activity during their work.

A Position Paper of the Italian Society of Pharmacology recently confirmed the importance of a complete academic education of future Pharmacists on preventive topics during their university carrier, throughout

an alliance between Scientific Societies of Preventive Medicine and degree courses in Pharmacy (8).

A community Pharmacist properly educated and informed about vaccination issues, could represent in future a key component in the vaccination offer and counselling in Italy (8, 11, 12).

The proposal of a dedicated space for vaccination in Pharmacies, suggested by the National Vaccination Plan 2017-2019, seemed to be well accepted by a large majority of Community Pharmacists involved in the study, who recognized their possible role in promoting and offering vaccinations in the future (7, 10).

In general, the interviewed Pharmacists demonstrated good attitudes towards vaccination, reporting intention to vaccinate themselves or their children in the future. This attitude represents an important step in providing role models for general population that generally would never accept any vaccination without the certainty that the HCW of reference (GP, pediatrician,

nurse...), vaccinated himself and his sons (19, 24).

The general lack of vaccination adherence by the Italian HCWs could have contributed to the reduction of vaccination coverage among general population and the other HCWs, observed and registered in Italy in these last years (15, 25, 26).

According to the questionnaire results, Community Pharmacists showed good knowledge and attitudes regarding not only vaccinations, but also about the websites mainly consulted and considered trustworthy. For this reason, the Pharmacist could play a key role in information and recommendation of the most reliable websites to our consumers.

Knowledge and attitudes reported by community Pharmacists interviewed could lead to properly counseling and communicating with general population and clients that addressed to the Pharmacies (27).

The study participants evidenced the key role, at the present time, of the community Pharmacist in vaccination counselling (28). More than 90% of the clients asked for explanations about vaccinations (often = 37.5% or rarely = 55.5%).

Furthermore, these results confirmed the importance of the academic training of the Pharmacists about vaccination topics in order to promote vaccination adherence among general population (27-29).

In the next future, the role of Community Pharmacist should be even more integrated with Public Health Practitioners, GPs and Pediatricians, in order to promote vaccinations and preventive practices among general population. The Community Pharmacist should be considered not only an HCWs but also a Public Health opinion leader, ready to assert and support the safety and the effectiveness of vaccinations, with evidence based knowledge supported by solid communication skills (27, 29).

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Riassunto

Il ruolo del Farmacista Territoriale nella promozione delle vaccinazioni nella popolazione generale in accordo con il Piano Nazionale della Prevenzione vaccinale 2017-2019: risultati di un'indagine condotta nella Regione Sicilia

Introduzione. Il Piano Nazionale della Prevenzione Vaccinale 2017-2019 prevede il miglioramento delle conoscenze e delle attitudini degli operatori sanitari (OS) sulla prevenzione vaccinale, per la diffusione della cultura vaccinale nella popolazione generale. Similmente al Medico di Medicina Generale (MMG), il Farmacista Territoriale rappresenta un punto di riferimento fondamentale per i pazienti e i soggetti sani nella promozione delle vaccinazioni. Obiettivi del presente studio sono l'analisi le conoscenze e le attitudini riguardanti le tematiche vaccinali dei Farmacisti Territoriali e la valutazione dell'attività di counselling vaccinale svolta dagli stessi durante la loro attività lavorativa.

Materiali e metodi. Un questionario, precedentemente validato costituito da 5 sezioni e da 28 domande, è stato somministrato ad un campione di Farmacisti Territoriali operanti in Sicilia Occidentale. La survey è stata condotta attraverso un format online del questionario autocompilabile, che indagava le principali variabili sociodemografiche, le conoscenze e le attitudini riguardo le tematiche vaccinali, oltre che il ruolo del farmacista quale *counselor* vaccinale durante lo svolgimento dell'attività lavorativa.

Risultati. Il 99,2% dei 120 Farmacisti che hanno aderito alla survey sono pienamente favorevoli al Calendario Vaccinale della Regione Sicilia. Peraltro, il 95% di essi (n=114) dichiara di essere vaccinato, di avere vaccinato o di essere propenso in futuro a vaccinare i propri figli. Secondo il campione in studio, il 90% dei clienti delle Farmacie chiede indicazioni su tematiche vaccinali, e gli stessi Farmacisti ritengono che la fiducia nei confronti dei vaccini sia aumentata (30%) o rimasta stabile (55%) nel corso degli ultimi 5 anni. Infine, i Farmacisti intervistati ritengono che le corrette informazioni fornite dal MMG o dal Pediatra di libera scelta (PLS) rappresentino la principale motivazione per l'incremento della fiducia nei confronti delle vaccinazioni, mentre la disinformazione del web e di alcuni mass media è alla base del calo di fiducia nelle stesse.

Conclusioni. Dai risultati dello studio emerge il ruolo chiave del Farmacista Territoriale nel counselling vacci-

nale per la popolazione generale. Appare fondamentale prevedere in futuro una forte collaborazione tra i Farmacisti e tutti gli attori della promozione vaccinale (MMG, PLS, operatori di Sanità Pubblica) sia per uniformare le tecniche di promozione vaccinale che per standardizzare i percorsi di formazione universitaria sulle vaccinazioni per tutte le categorie sopracitate.

References

1. Signorelli C, Odone A, Conversano M, Bonanni P. Deaths after Fluvad flu vaccine and the epidemic of panic in Italy. *BMJ* 2015; **14**(350): h116.
2. Restivo V, Costantino C, Fazio TF, et al. Factors Associated with HPV Vaccine Refusal among Young Adult Women after Ten Years of Vaccine Implementation. *Int J Environ Res Public Health* 2018; **15**(4): 770.
3. Costantino C, Restivo V, Tramuto F, Casuccio A, Vitale F. Universal rotavirus vaccination program in Sicily: Reduction in health burden and cost despite low vaccination coverage. *Hum Vaccin Immunother* 2018; **14**(9): 2297-302. doi: 10.1080/21645515.2018.1471306.
4. National Health Institute (NHI). Measles and Rubella news- July 2018 update. Available on: http://www.epicentro.iss.it/problemi/morbillo/bollettino/RM_News_2018_43.pdf [Last accessed: 2018, Oct 23].
5. World Health Organization. Regional Office for Europe (WHO/Europe). 7th meeting of the European Regional Verification Commission for Measles and Rubella Elimination (RVC). Report (2018). Available on: http://www.euro.who.int/__data/assets/pdf_file/0008/378926/7th-RVC-Meeting-Report-FINAL.pdf?ua=1 [Last accessed: 2018, Oct 23].
6. Costantino C, Vitale F. Influenza vaccination in high-risk groups: a revision of existing guidelines and rationale for an evidence-based preventive strategy. *J Prev Med Hyg* 2016; **57**(1): E13-8.
7. Ministero della Salute. Piano Nazionale della Prevenzione Vaccinale (PNPV) 2017-2019. Available on: http://www.salute.gov.it/imgs/C_17_pubblicazioni_2571_allegato.pdf [Last accessed: 2018, Oct 23].
8. Società Italiana di Farmacologia. I Vaccini e le Vaccinazioni. Available on: <http://www.fimp.pro/images/vaccini.pdf> [Last accessed: 2018, Oct 23].
9. Vaccaro CM. Gli anziani e la farmacia: un rapporto privilegiato da potenziare. Available on: <https://www.federfarma.it/Documenti/Indagini/AnzianiFarmacia.aspx> [Last accessed: 2018, Oct 23].
10. Conferenza Stato Regioni. Delibera della Conferenza sul documento recante "Piano Nazionale Prevenzione Vaccinale 2017 -2019". Available on: http://www.statoregioni.it/Documenti/DOC_056323_Rep%20n%2010%20%20CSR%20Punto%207%20odg.pdf [Last accessed: 2018, Oct 23].
11. Sisti M. Il ruolo del Farmacista nell'informazione sanitaria, la profilassi vaccinale. Available on: <file:///C:/Users/Acer/Downloads/Farmacista%20e%20Vaccinazioni.pdf> [Last accessed: 2018, Oct 23].
12. Biasio LR, Corsello G, Costantino C, et al. Communication about vaccination: A shared responsibility. *Hum Vaccin Immunother* 2016; **12**(11): 2984-7.
13. Questionnaire: Il Farmacista assertore dell'immunità di gregge. Available on: <https://docs.google.com/forms/d/e/1FAIpQLSfubsnmam4VRkKno8eB1-5ZZSeCjPRsG1VpE9vR3alPGRdcDg/viewform?fbzx=5290800550960922000> [Last accessed: 2018, Oct 23].
14. DemoIstat 2017. Available on: <http://demo.istat.it/pop2017/index.html> [Last accessed: 2018, Oct 23].
15. Costantino C, Amodio E, Calamusa G, Vitale F, Mazzucco W. Could university training and a proactive attitude of coworkers be associated with influenza vaccination compliance? A multicentre survey among Italian medical residents. *BMC Med Educ* 2016; **16**: 38.
16. Costantino C, Amodio E, Vitale F, et al. Attitudes, behaviours and perceptions of Italian General Practitioner trainees towards influenza vaccination in Western Sicily (Italy). *Ital J Public Health* 2012; **9**(1): 33-9.
17. Di Gregori V, Franchino G, Marcantoni C, Simone B, Costantino C. Logistic regression of attitudes and coverage for influenza vaccination among Italian Public Health medical residents. *J Prev Med Hyg* 2014; **55**: 152-7.
18. Costantino C, Battaglia A, D'Asta M, et al. Knowledge, attitudes and behaviors regarding influenza vaccination among hygiene and preventive medicine residents in Calabria and Sicily. *EuroMediterranean Biomed J* 2012; **7**(17): 77-83.

19. Bechini A, Bonanni P, Lauri S, et al. Strategies and actions of multi-purpose health communication on vaccine preventable infectious diseases in order to increase vaccination coverage in the population: The ESCULAPIO project. *Hum Vaccin Immunother* 2017; **13**(2): 369-75.
20. Tabacchi G, Costantino C, Cracchiolo M, et al. Information sources and knowledge on vaccination in a population from southern Italy: The ESCULAPIO project. *Hum Vaccin Immunother* 2017; **13**(2): 339-45.
21. Stefanelli P, Miglietta A, Pezzotti P, et al. Increased incidence of invasive meningococcal disease of serogroup C / clonal complex 11, Tuscany, Italy, 2015 to 2016. *Euro Surveill* 2016; **21**(12).
22. Costantino C, Restivo V, Ventura G, et al. Increased Vaccination Coverage among Adolescents and Young Adults in the District of Palermo as a Result of a Public Health Strategy to Counteract an 'Epidemic Panic'. *Int J Environ Res Public Health* 2018; **15**(5). Pii: E1014.
23. Chirico F. The new Italian mandatory vaccine Law as a health policy instrument against the anti-vaccination movement. *Ann Ig* 2018; **30**(3): 251-6.
24. Tabacchi G, Costantino C, Napoli G, et al. Determinants of European parents' decision on the vaccination of their children against measles, mumps and rubella: A systematic review and meta-analysis. *Hum Vaccin Immunother* 2016; **12**(7): 1909-23.
25. Squeri R, Genovese C, Trimarchi G, Palamara MAR, La Fauci V. An evaluation of attitude toward vaccines among healthcare workers of a University Hospital in Southern Italy. *Ann Ig* 2017; **29**(6): 595-606.
26. Squeri R, Riso R, Facciola A, et al. Management of two influenza vaccination campaign in health care workers of a university hospital in the south Italy. *Ann Ig* 2017; **29**(3): 223-31.
27. Thomas RE, Lorenzetti DL. Interventions to increase influenza vaccination rates of those 60 years and older in the community. *Cochrane Database Syst Rev* 2018 May 30; **5**:CD005188.
28. Queeno BV. Evaluation of Inpatient Influenza and Pneumococcal Vaccination Acceptance Rates With Pharmacist Education. *J Pharm Pract* 2017; **30**(2): 202-8.
29. Marotta C, Raia DD, Ventura G, et al. Improvement in vaccination knowledge among health students following an integrated extracurricular intervention, an explorative study in the University of Palermo. *J Prev Med Hyg* 2017; **58**(2): E93-E98.

Corresponding author: Dr. Claudio Costantino, Department of Health Promotion, Mother Child Care, Internal Medicine and Excellence Specialist "G. D'Alessandro", University of Palermo, Italy, Via del Vespro 133, 90127 Palermo, Italy

e-mail: claudio.costantino01@unipa.it